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Ambulatory surgery complications and patient fitness

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The effect of patient fitness on perioperative and post-discharge complications has been reviewed in 6565 consecutive day cases. American Society of Anesthesiology (ASA) classification class III patients had a significantly higher incidence of complications (5.98%) than combined ASA I and II patients (2.48%). Most complications were directly related to the surgery performed. The increased incidence of complications in ASA III patients was partly due to increased medically-related complications but also to a disproportionately high incidence of post-discharge surgical complications in patients undergoing lens extraction under local anaesthetic. Too few ASA III patients underwent general anaesthesia in this series to provide a reliable measure of the influence of anaesthesia on medically-related complications in less fit patients.

Key words: Complications, outcome, patient fitness

Introduction

The concept of ambulatory surgery is not new; anaesthetic practice began as an outpatient-based service until Lister's demonstration of antisepsis in the early 1860s prompted the delivery of hospital-based surgery and anaesthesia[1]. However the number of procedures judged suitable for ambulatory surgery has increased dramatically since the 1980s. This increase has been due to improvements in anaesthetic and surgical techniques, willingness by providers to undertake more complex procedures and the fiscal advantages of same-day surgery[2].

Recent studies have shown ambulatory surgery to be both effective and safe for fit patients[3–7]. Less is known about outcome for less fit patients, typically those corresponding to American Society of Anesthesiology (ASA) fitness classification levels III and IV[2] (Table 1). An increasing proportion of elderly and less fit patients together with cost advantages may see more ASA III and IV patients managed as ambulatory patients in the future. Information on outcome for such patients is needed to refine guidelines for the selection and management of patients with pre-existing medical conditions. Presently such information is limited. Although outcome, measured as incidence of major complications in a 2-week interval from the procedure, has been shown to be not significantly worse for ASA III patients than for fitter patients[4], the range of different anaesthetic techniques used in the patient groups were not identified. Previous studies measuring outcome by unanticipated hospital admission on the day of surgery have shown that the admission rate may be higher for less fit patients[8]. Other work has suggested that unanticipated admissions may be more affected by age than ASA status and that such admissions were more likely to be related to the type of anaesthesia or surgical procedure than patient fitness[5]. A recent multi-centre study[7], mostly restricted to general anaesthesia, found reduced patient fitness was associated with an increased risk of some adverse perioperative events. However that study did not include unanticipated hospital admissions and the data on post-discharge complications was incomplete.

In this study we have sought information on the effect of patient fitness on perioperative and post-discharge

Table 1. ASA Classification

ASA I	Normal healthy patient
ASA II	Patient with mild systemic disease
ASA III	Patient with significant systemic disease that does not pose a constant threat to life
ASA IV	Patient with significant systemic disease that does pose a constant threat to life
ASA V	Moribund patient not expected to survive with or without surgery

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complications, in the first 6565 cases in the Day Surgery Unit at the Royal Adelaide Hospital, during the period between May 1989 and March 1993.

Methods

The Day Surgery Unit at the Royal Adelaide Hospital is an architecturally integrated but functionally separate unit associated with a major adult teaching hospital. All patients were assessed prior to the day of surgery by an assessment team of anaesthetists and trained assessment nurses who streamlined this process by the use of a patient questionnaire[9,10]. Patient ASA status was assessed and recorded preoperatively by an anaesthetist. Other perioperative data for patients, procedures, anaesthesia and complications was recorded prospectively and entered into a computerized database for analysis.

Complications were defined in accordance with the Federated Ambulatory Surgery Association (FASA) definition[3] for major complications as 'untoward events associated with the ambulatory surgical experience, with the potential for serious harm'. Perioperative complications included all unanticipated admissions on the day of surgery as well as some anaesthetic complications that did not result in admission. Post-discharge complications were limited to complications that were associated with the ambulatory procedure, that required hospital readmission within an interval of 14 days after discharge. These were identified by searching the hospital mainframe computer database for details of all patients who presented to the hospital within 14 days of discharge after ambulatory surgery.

Statistical analysis

Comparison of the incidence of complications in different patient categories was carried out with χ^2 analysis.

Results

Patients and procedures

The nature of the surgical caseload is illustrated in Figure 1. ASA status was not available in 82 cases; of the remaining 6483, 4149 (64.0%) were ASA I, 1809 (27.9%) were ASA II, 509 (7.9%) were ASA III and 16 (0.2%) were ASA IV. Figure 2 shows the distribution of patients according to ASA class and how the age profile of patients changes with ASA classification; the average age increasing with decreasing patient fitness. General anaesthesia was the most frequently used anaesthetic technique (60.1% of all cases), followed by local anaesthesia with intravenous sedation (25.2%), local anaesthesia without sedation (11.6%) and regional anaesthesia (3.1%). The frequency of use of different anaesthetic techniques in different ASA groups is shown in Figure 3, which also shows how the use of general anaesthesia declined with decreasing patient fitness.

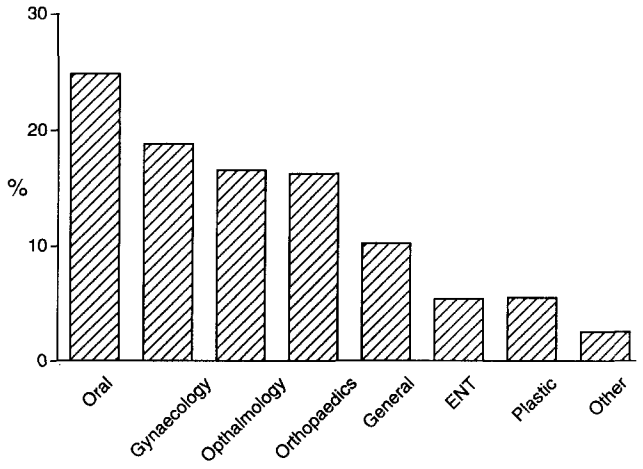

Figure 1. Surgical caseload.

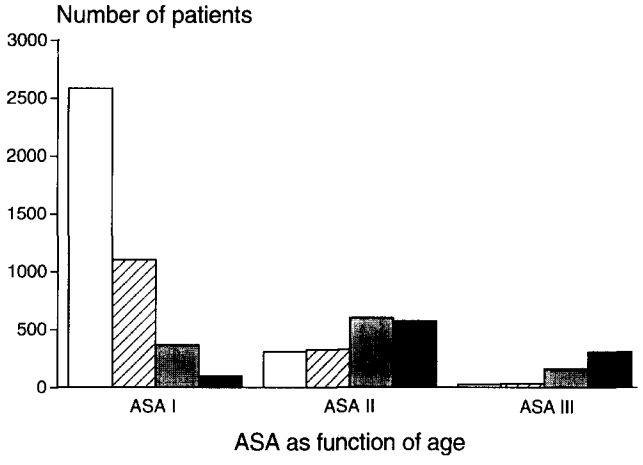

Figure 2. ASA distribution with patient age profile. □ 0–29; ▩ 30–49; ▨ 50–69; ■ 70+.

Unanticipated hospital admissions

The overall rate of unanticipated hospital admissions on the day of surgery was 1.50%. The admission rate for combined ASA I and II patients (1.40%) was less than that for ASA III patients (2.20%), but the difference was not statistically significant. There were no admissions on the day of surgery in the 16 ASA IV patients.

Complications

ASA I, II and III patients

There were 178 (2.75%) complications in the 6467 patients in ASA classes I, II and III in the combined perioperative and post-discharge periods, up to postoperative day 14. There were no patient deaths or serious morbidity. The majority of complications were directly related to surgery (surgically-related) (2.20%), with complications related to pre-existing medical conditions (medically-related) the next most common (0.29%)

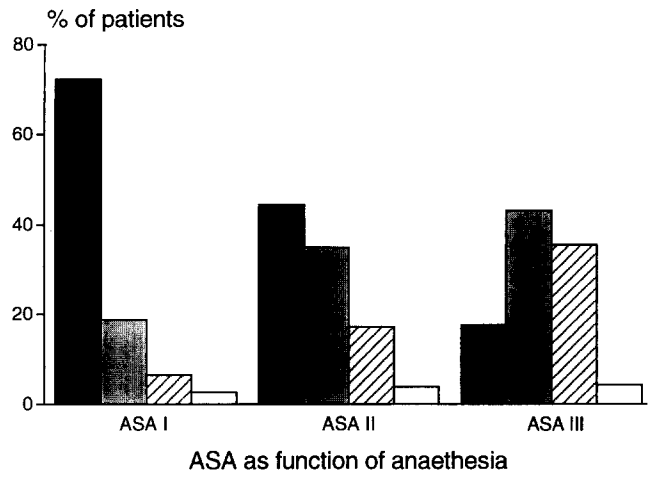

Figure 3. Use of different anaesthetic techniques in ASA groups. ■ General anaesthesia; ▨ local anaesthesia with intravenous sedation; ▩ local anaesthesia; □ regional anaesthesia.

(Table 2). The incidence of all complications was significantly less in combined ASA I and II patients (2.48%) than in ASA III patients (5.89%) and the incidence of surgically (2.04%) and medically-related (0.20%) complications in ASA I and II patients were both significantly less than in ASA III patients (3.93% and 1.38% respectively) (Table 3). The numbers of anaesthetic-related and socially-related complications were too small for any useful comparison between fit and less fit patients.

The incidence of both surgically-related and medically-related complications in fitter and less fit patients are shown separately for the perioperative and post-discharge periods in Tables 4 and 5 respectively. In the perioperative period, there was no significant difference in the incidence of surgically-treated complications between combined ASA I and II (1.02%) and ASA III patients (1.18%), but the incidence of medically-related complications in ASA I and II patients (0.10%) was significantly less than in ASA III patients (0.59%). However, for post-discharge complications, the incidence of surgically-related complications (1.02%) was significantly lower in ASA I and II patients than in ASA III patients (2.75%), as also was the case with medically-related complications (0.10% and 0.79% respectively).

Table 6 contains details of all surgically-related post-discharge complications. A major proportion of these occurred after ophthalmic surgery, most commonly lens extraction under local anaesthesia. About one third of these ophthalmic complications involved ASA III patients.

There were 11 (0.61%) medically-related complications in the ASA II group. This incidence was less than for ASA III patients (1.38%) but the difference was not statistically significant.

One patient, assigned ASA I, presented postoperatively with symptoms consistent with myocardial ischaemia.

ASA IV patients

There were 16 patients in this group. One patient died from an exacerbation of chronic respiratory disease several days after a flexor retinaculotomy performed under local anaesthesia. There were no other perioperative or post-discharge complications in this group. Details of patients, procedures and anaesthetic techniques used for these cases are included in Table 7. The small number of patients in this group precluded any further analysis.

Discussion

In this review of ambulatory surgery outcome we sought the effect of patient fitness on the incidence of complications from the time of surgery up until the 14th post-operative day. Most complications (80%) were direct complications of the surgery performed. Patient fitness should have no direct influence on surgically-related complications. In this study the higher incidence of these complications in ASA III patients compared to combined ASA I and II patients was largely due to a disproportionate number of post-discharge surgically-related complications in ASA III patients undergoing eye surgery.

The effect of patient fitness should be most obvious in the less frequent medically-related complications. There was a significant increase in the incidence of these complications in the less fit ASA III patients compared to combined ASA I and II patients. This difference appeared to be consistently maintained for both perioperative and post-discharge complications, although when separated into these groups, the numbers of complications were not large enough to allow for completely reliable statistical comparison.

It could be argued that the comparison of medically-related complications between the combined ASA I and II groups and the ASA III group is misleading since ASA I patients should have, by definition, no pre-existing medical problems, and the grouping of ASA I and II patients therefore reduces the incidence of these complications below that expected for ASA II patients alone. We have used the combined ASA I and II groups because this represents the patient population commonly chosen as suitable for ambulatory surgery. The incidences of medically-related complications in the combined ASA I and II and the ASA III groups therefore may have some predictive value for complication rates anticipated as less fit patients are added to a typical ambulatory surgery patient case load. In this study, the incidence of medically-related complications in ASA II patients (0.61%) was approximately half that for ASA III patients (1.38%). Although this difference was not statistically significant, the observed incidences may be reasonable estimates of those expected if larger patient numbers were reviewed.

The incidence of medically-related complications however should also depend on the anaesthetic type and is likely to be highest in patients undergoing general anaes-

Table 2. Complications for all (ASA I, II and III patients) in combined perioperative and post-discharge periods

	*GA** n = *3887*	*LA/SED†* n = *1630*	*LA‡* n = *750*	*REGL§* n = *200*	*No.*	*Incidence %*
Surgery related	75	44	21	2	142	2.20
Medically related	9	4	4	1	19	0.29
Anaesthesia related	9	0	1	0	10	0.15
Socially related	3	2	1	1	1	0.11
Total					178	2.75

*GA, General anaesthesia; †LA/SED, local anaesthesia with intravenous sedation; ‡LA, local anaesthesia without sedation; §REGL, regional anaesthesia.

Table 3. Complications in the combined perioperative and post-discharge periods for ASA I and II patients, compared to those for ASA III patients

ASA I and II (n = *5958)*	*GA* n = *3756*	*LA/SED* n = *1497*	*LA* n = *532*	*REGL* n = *173*	*No.*	*Incidence %*
Surgery related	73	37	10	2	122	2.04*
Medically related	6	2	3	1	12	0.20
Anaesthesia related	9	0	0	0	9	0.15
Socially related	3	2	0	0	5	0.08*
Total					148	2.48*
ASA III (n = 509)	*GA* n = *131*	*LA/SED* n = *133*	*LA* n = *218*	*REGL* n = *27*	*No.*	*Incidence %*
Surgery related	2	7	11	0	20	3.93*
Medically related	3	2	1	1	7	1.38*
Anaesthesia related	0	0	1	0	1	0.20
Socially related	0	0	1	1	2	0.39*
Total					30	5.89*

*Difference significant ($P<0.05$).
Abbreviations as in Table 2.

Table 4. Perioperative complications for ASA I and II patients compared to those for ASA III patients

ASA I and II (n = 5958)	*GA* n = *3756*	*LA/SEDN* n = *1497*	*LA* n = *532*	*REGL* n = *173*	*No.*	*Incidence %*
Surgery related	44	14	3	0	61	1.02
Medically related	3	1	1	1	6	0.10*
Anaesthesia related	8	0	0	0	8	0.13
Socially related	3	2	0	0	5	0.08*
Total					80	1.34
ASA III (n = 509)	*GA* n = *131*	*LA/SEDN* n = *133*	*LA* n = *218*	*REGL* n = *27*	*No.*	*Incidence %*
Surgery related	0	3	3	0	6	1.18
Medically related	2	1	0	0	3	0.59*
Anaesthesia related	0	0	0	0	0	–
Socially related	0	0	1	1	2	0.39*
Total					11	2.16

*Difference significant ($P<0.05$).
Abbreviations as in Table 2.

thesia. Information on medically-related post-discharge complications should be of particular use in establishing guidelines for the selection and management of less fit patients undergoing general anaesthesia. The number of ASA III patients who received general anaesthesia in this series was too small to allow any useful comparison in outcome between fit and less fit patients.

In conclusion, most complications observed were directly related to the surgery performed with the second most frequent complications related to pre-existing

Table 5. Post-discharge complications for ASA I and II patients compared to those for ASA III patients

ASA I and II (n = 5958)	*GA n = 3756*	*LA/SEDN n = 1497*	*LA n = 532*	*REGL n = 173*	*No.*	*Incidence %*
Surgery related	29	23	7	2	61	1.02*
Medically related	3	1	2	0	6	0.10*
Anaesthesia related	1	0	0	0	1	0.02
Socially related	0	0	0	0	0	–
Total					68	1.14*
ASA III (n = 509)	*GA n = 131*	*LA/SEDN n = 133*	*LA n = 218*	*REGL n = 27*	*No.*	*Incidence %*
Surgery related	2	4	8	0	14	2.75*
Medically related	1	1	1	1	4	0.79*
Anaesthesia related	0	0	1	0	1	0.20
Socially related	0	0	0	0	0	–
Total					19	3.73*

*Difference significant ($P<0.05$).
Abbreviations as in Table 2.

Table 6. Details of post-discharge surgically-related complications

	n	*ASA I/II*	*ASA III*
Oral surgery	9	9	0
Ophthalmic	35*	23	12
Gynaecology	13	13	0
Orthopaedics	9	9	0
Plastic surgery	4	3	1
General surgery	4	3	1
Otolaryngology	1	1	0
Total	75	61	14

*32 of these procedures were carried out under local anaesthesia and three under general anaesthesia.

Table 7 Details of ASA IV patients

Procedure	*Anaesthetic Type*		
	GA	*LA/SEDN*	*LA*
Lens extraction and implant		3	3
Removal of skin lesion		2	2
Ectropion repair		2	
Excision of breast lesion			1
Oesophagoscopy and dilatation	1		
Carpal tunnel repair			1
Infusaport insertion	1		

medical conditions. Although the overall rate of these medically-related complications was only 0.29%, there was a significant increase in ASA III patients (1.38%) compared to those in the combined ASA I and II group (0.20%). This increase appeared to be evenly divided between complications in the perioperative period and the post-discharge interval to the 14th postoperative day. The incidence of these medically-related complications should depend on the type of anaesthesia used, but in this study there were too few ASA III patients who underwent general anaesthesia to allow a comprehensive study of complications in this relevant patient group. Multi-centre studies could provide adequate ASA III patient numbers to measure the impact of anaesthesia on medically-related complications.

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